Electronic Version
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Claims

[c1] What is claimed is:

1. A probe for improved homogeneity in magnetic resonance (MR) imaging, the probe comprising:
an RF coil for receiving MR data;
a collapsible housing enclosing the RF coil and constructed for insertion into a subject to be imaged; and
a homogeneity enhancing material disposable within the collapsible housing.

[c2] 2. The probe of claim 1 wherein the homogeneity enhancing material has a magnetic permeability similar to that of the subject.

[c3] 3. The probe of claim 1 wherein the collapsible housing is an expandable membrane to allow the RF coil to receive MR data from a wider area of the subject when expanded with the homogeneity enhancing material then would be otherwise.

[c4] 4. The probe of claim 1 wherein the homogeneity enhancing material includes one of a gel and a liquid.

[c5] 5. The probe of claim 1 wherein the homogeneity enhancing material includes a material having a magnetic

permeability similar to that of water.

[c6] 6. The probe of claim 1 wherein the homogeneity enhancing material includes a perfluorocarbon material.

[c7] 7. The probe of claim 3 wherein the homogeneity enhancing material expands the collapsible housing after insertion into the subject to be imaged.

[c8] 8. The probe of claim 7 wherein the collapsible housing is constructed free of gases.

[c9] 9. The probe of claim 1 formed as an endorectal probe.

[c10] 10.The probe of claim 1 further comprising an inflatable retainer that secures the RF coil within the subject to be imaged when inflated with the homogeneity enhancing fluid.

[c11] 11. An MR imaging apparatus comprising:
a plurality of gradient coils positioned about a bore of a magnet to impress a polarizing magnetic field;
an RF transceiver system;
an RF switch controlled by a pulse module to transmit RF signals;
an RF coil assembly configured for internal MR image acquisition and having at least one RF coil disposed within a housing that is constructed for insertion into a subject;

and

a homogeneity enhancing fluid disposable within the housing to improve homogeneity during internal MR image acquisition.

[c12] 12. The MR imaging apparatus of claim 11 wherein the housing is an expandable membrane and the homogeneity enhancing fluid causes the expandable membrane to inflate.

[c13] 13. T he MR imaging apparatus of claim 11 wherein the homogeneity enhancing material has a magnetic permeability similar to that of the subject.

[c14] 14. The MR imaging apparatus of claim 11 wherein the homogeneity enhancing fluid includes a perfluorocarbon material.

[c15] 15. The MR imaging apparatus of claim 11 further comprising a control means to inflate the housing with the homogeneity enhancing fluid.

[c16] 16. The MR imaging apparatus of claim 15 wherein the control means comprises a syringe.

[c17] 17. The MR imaging apparatus of claim 15 wherein the control means comprises an electronically controlled pump.

[c18] 18. The MR imaging apparatus of claim 15 wherein the control means automatically inflates the housing with the homogeneity enhancing fluid.

[c19] 19. The MR imaging apparatus of claim 11 further comprising a retainer filled with the homogeneity enhancing fluid to secure the at least one RF coil within the subject.

[c20] 20. A method of using an MR imaging device with improved homogeneity comprising:
positioning an RF coil within a housing that is capable of being inserted within an imaging subject; and
filling the housing with a homogeneity enhancing material.

[c21] 21. The method of manufacturing of claim 20 further comprising attaching a pump to the housing to inflate the housing with the homogeneity enhancing material.

[c22] 22. The method of manufacturing of claim 20 further comprising attaching an automated inflation control to control the inflation the housing with a homogeneity enhancing material.

[c23] 23. The method of manufacturing of claim 20 wherein the homogeneity enhancing material comprises a perfluorocarbon material.

24. The method of manufacturing of claim 20 wherein the homogeneity enhancing material includes one of a gel and a liquid.

[c24] 25.The method of manufacturing of claim 20 wherein the homogeneity enhancing material has a magnetic permeability similar to that of the imaging subject.

[c25] 26. A kit for an MR imaging device with improved homogeneity comprising:
an RF coil;
a flexible housing configured to contain the RF coil therein and further configured to be inserted within an imaging subject; and
a supply of a homogeneity enhancing material to fill and expand the flexible housing after insertion into the imaging subject.